

WOODLAND STEWARDSHIP PLAN

Prepared for:

Pillager Public Schools Karl Kaufmann

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S 1/2 NE - Sec. 35, T. 134, R. 31; SENE - Sec. 5, T. 133, R. 29

Cass County; Minnesota

Deed Acres: **120.7**

Management Plan Acres: **120.7**

Prepared by:

Alex Brothen

MNDNR

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Brainerd, MN 56401

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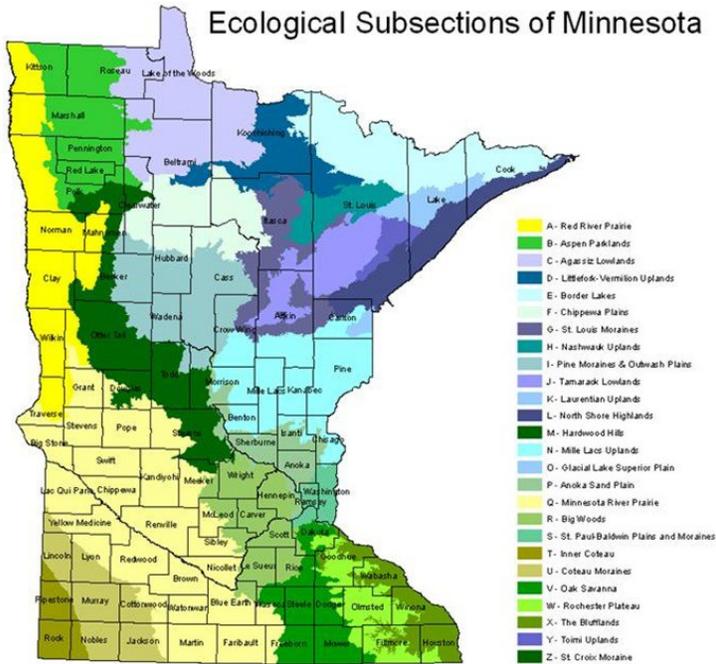
alex.brothen@state.mn.us December 15, 2017

Karl Kaufmann's forest stewardship goals for this property are:

- To use this land as an educational tool through self-guided trail and demonstrational harvests and habitats.
- To promote land and wildlife stewardship through forest management methods that will increase the number and diversity of wildlife species on the property.

PROPERTY DESCRIPTION: Landscape Region

The property falls within the **Pine Moraines & Outwash Plains** Ecological Subsection.



General Description:

The Itasca Moraine forms most of the northern boundary. To the west, the east side of the Alexandria Moraine is the dividing line. Rainy Lobe ground moraine and end moraines form the eastern boundary.

This subsection is a mix of end moraines, outwash plains, till plains, and drumlin fields. White and Norway pine dominated the majority of forest communities on end moraines and till plains. Jack pine barrens and jack pine woodlands were found on well-drained sites on outwash plains. Black spruce, tamarack, white cedar, and black ash were prominent tree species in poorly to very poorly drained soils. Lakes are very common on the end moraines and some of the Outwash plains. Current land uses include tourism, forestry, and some agriculture.

Landform:

This subsection consists primarily of large outwash plains, narrow outwash channels, and end moraines (Hobbs and Goebel 1982). The moraines is relatively large and were formed from portions of several glacial lobes. Most of the glacial drift was sandy, but there is loamy drift to the north.

Bedrock Geology:

Thick glacial drift covers bedrock over most of the subsection. Thicknesses range from 200 to over 600 feet. The greatest depths are in the southwestern portion (Olsen and Mossler, 1982). A diversity of Precambrian rock underlies the glacial drift (Morey 1976; Morey et al. 1981). There are also iron formations at the southeastern edge of the subsection, along with argillite, siltstone, quartzite, and graywacke. Cretaceous marine shale, sandstone, and variegated shale are localized in the southwest. (Albert 1993).

Soils:

The morainic soils are predominantly coarse to moderately coarse in texture (sands and sandy loams), although calcareous loamy soils are present on the Itasca Moraine and the Fosston Till Plain. (Dept. of Soil Science, Univ. of Minnesota 1969, 1980). On outwash plains, excessively drained sands are prevalent, but they are interspersed with numerous wetlands. Over 10% of the soils are organic. The soils are classified as Psamments and Aquents on outwash plains (Anderson and Origal 1984). Boralfs are most common on moraines.

Climate:

Total annual precipitation ranges from 23 inches in the northwest to 27 inches in the east, with about 40% occurring during the growing season. Only 12 to 16% of the annual precipitation falls during winter months (based on Midwest Climate Center 1992). Growing season length varies from 111 to 131 days.

Hydrology:

Kettle lakes are common on pitted outwash plains and within stagnation moraines. There are hundreds of lakes within the subsection that have a surface area greater than 160 acres. The headwaters of the Mississippi River (Itasca Lake in Itasca State Park) is in this subsection. Other large rivers flowing through the outwash plains of the subsection include the Pine and Crow Wing rivers.

Pre-settlement Vegetation:

Jack pine, in a mix with northern pin oak, was the most common species on excessively drained portions of broad outwash plains. Large areas of the other landforms were dominated by aspen-birch and pine forests (mixed Norway and white pine). Norway pine-white pine forests, occupied the rolling to irregularly sloped end moraines. Mixed hardwood and pine forests, dominated by a diverse mix of northern hardwoods and white pine, were found in the most fire-protected areas at the northern and eastern edges of the subsection. Fire protection was offered by irregular topography, broad wetlands, and relatively large lakes. Some of the hardwood-pine forests mapped by Marschner may have been dominated by northern red oak and basswood, without sugar maple (Albert 1993).

Present Vegetation and Land Use:

Forest management and tourism are the most important land uses. Agriculture is common in the west, where center pivot irrigation of corn and potatoes is common. Tourism is common where there are concentrations of lakes. Summertime swells the population of these areas significantly. Brainerd, a community of 14,000 absorbs more than ten times that number within a 30-mile radius during summer weekends.

Natural Disturbances:

Fire occurred on a 10 to 40 year rotation within much of the subsection, accounting for the dominance by upland conifers and quaking aspen-birch forests (Frissel 1973).

Conservation Concerns:

The Minnesota DNR planning team has recommended that 1) a certain percentage of each forest community be maintained in old growth conditions, 2) the amount of oak, northern white-cedar, and white pine within the subsection be increased, 3) that large areas of contiguous forest be maintained for forest-interior dwelling species, 4) semi-primitive (few or no roads) be maintained, 5) habitat be provided for endangered, threatened, and special concern biota, and 6) that cultural resources be protected.

Other concerns include lakeshore development, amount of timber harvesting, and water quality issues.

PROPERTY DESCRIPTION: General Property Description

Rare and Natural Features:

A search of the Minnesota Natural Heritage Information System found the following rare and natural features within 1 mile of both parts of the school forest: Blanding's Turtle, Oakes' Pondweed, Bald Eagle, and Olive-colored Southern Naiad. We urge you to become familiar with rare species, so you are able to identify them on your property.

Cultural Heritage Sites:

A check of the State Archeologist's inventory did not reveal any recorded historical features on your land. Heritage, or Cultural resources are of concern in forest management because many of them occur in Minnesota's forestlands and they can be damaged by some management activities. The DNR feels a landowner should at least be aware that heritage resources may be present on the property. Ideally a landowner would plan management activities to avoid damaging any heritage resources that are present. Such features may still exist on your property since neither this plan, nor the existing records are based on exhaustive inventories. If you believe your property might have some rare or historical features, please contact me about the process of further survey work.

Tree Farm:

This property is not enrolled as a Tree Farm.

Conservation Easement:

No conservation easements.

Grant:

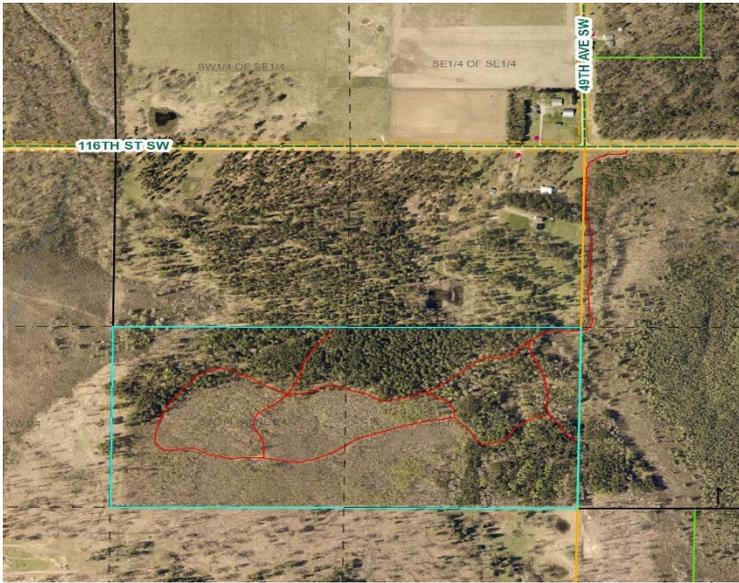
Not funded by a grant.

PROPERTY DESCRIPTION: History and Interaction with Nearby Properties

The Pillager school forest exists on two separate tracts of land. The original School forest (1) is located approximately 8 miles north and west of Pillager, Minnesota. The Charles and Carrie memorial forest (2) is located approximately 8 miles east and north of Pillager. Each of these two tracts have different histories so this plan will be separated into two sections one for each portion of the school forest to best describe its history and management.

1. The original school forest

Located in Section 35 Township 134 Range 31 W North May Township Cass County MN



Aerial Photo showing school forest location and access trails.

The original pillager school forest was created in the fall of 1953. The 80 acre tract is located in Section 35 of North May Township. Originally created for the students and faculty to be used as a laboratory for forestry and conservation studies, it is still being used today for the same goals

There is very little development in this area of the county so the school forest is in the center of a larger block of contiguous forest. This section of the school forest is surrounded by private land on the North, South, and West with public forest lands on the East. The land owner to the south has recently completed a timber sale adjacent to the school forest. This will provide a young forest directly next to the school forest.

Currently access to this area of the forest is very good.

The original forest lies one quarter mile south of the intersection of 116th street SW and 49th ave SW. A gated minimum maintenance forest road crosses state DNR forestry administered lands to directly access the school forest. Terrain is nearly level to gently rolling with loamy sand to sandy soils.

There has been quite a bit of forest management done within the original school forest since its creation.

To date, approximately **71,163** board feet of pine saw timber, **702** cords of aspen, jack pine, and mixed hardwood pulpwood have been harvested. The approximate stumpage value of these products is **\$25,717.92**.

In addition, over 18,000 trees have been planted within the Pillager school forest.

The current school forest manager also has created a long term plan for this part of the school forest. The desire is to create and maintain varying age classes and forest types within the original school forest area to produce habitat for wildlife and to show how a forest will look over time.

A brief timeline of the original school forest and an accounting of the timber harvest from the school forest are as follows.

Date Record of Events

1952 to fall of 1953	The Pillager school became interested in establishing a school forest and started working to create the pillager school forest. Between September and December of 1953 the school, Cass county, and at that time the Minnesota Department of Conservation all worked together to create the pillager school forest.
Dec 8th 1953	The final certificate of approval was signed creating the pillager school forest and the first management plan was written for the forest.
1954-1960	Six small harvests completed.
1960s	Not active.
1972	Small harvest completed.
1978	Salvage harvest due to blowdown in SE corner of forest
1980s	Thinning occurred in older Norway pine plantation in 1981. Sat idle through rest of the 80s.
1990s	Became active again - Trail system designed & constructed, 13-acre aspen sale sold & harvested, forest & wildlife signs erected. Jim Rardin family donated 40 acres to Pillager school forest. The property is located approximately 7 miles northeast of town.
June 18, 1993	Forest stewardship plan prepared by DNR foresters Al Sharp and Dean Makey.
June 1994	School forest boundaries surveyed by Comstock & Davis, Inc.
March 2001	Logger Rod Enberg from Motley harvested timber sale, 310 cords of aspen pulpwood, 70 cords of mixed hardwood fuelwood, and 3 cords of jack pine pulpwood. Rod Enberg donated the timber receipts to the Pillager school district. The funds were designated to be used only for forestry educational activities. Rod Enberg donated \$20,500.00 to this fund.
March 2007	Forester Allen Sharp inventoried and updated stewardship plan.
December 2017	Forester Alex Brothen inventoried and updated stewardship plan. Multiple areas of the original school forest are scheduled to be harvested in the winter of 2017-2018. Retired Forester Allen Sharp set up the timber sale and logger Rod Enberg will be harvesting it.

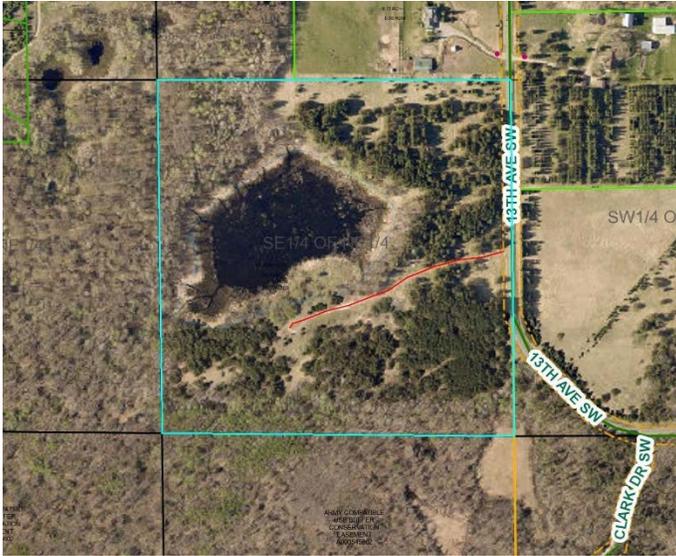
Timber Sale Activity

YEAR PRODUCT BD. FT. PULPWOOD VALUE Total

1955	Jack pine saw timber	4,225		\$ 198.34	
	Jack pine pulpwood		12	167.23	
	Firewood		6	6.00	
1955	Jack pine saw timber	1,431		90.07	90.07
1956	Peeled aspen pulpwood		7	118.40	
	Jack pine saw timber	3,807		192.18	310.58
1957	Jack pine pulpwood		7	118.40	118.40
1958	Peeled aspen pulpwood		12	184.50	184.50
1960	Peeled aspen pulpwood		19	285.00	285.00
1972	Jack pine pulpwood		4	19.20	
	Jack pine saw timber		2	12.00	31.20
1978	Norway& white pine saw timber	11,500		460.00	
	White spruce saw timber	1,100		33.00	
	Jack pine saw timber	600		12.00	505.00
1981	Norway pine saw timber	48,500		2,425.00	2,425.00
1994	Aspen pulp& bolts		220	2,310.00	
	Mixed hardwood fuelwood		30	153.00	2,463.00
2001	Aspen pulpwood		310	18,910.00	
	Jack pine pulpwood		3	19.00	
	Mixed hardwood fuelwood		70	4.60	18,933.60
TOTAL		71,163	702	\$25,717.92	\$25,717.92
Winter 2018					
Harvest					
NEW TOTAL					

2. Charlie and Carrie memorial forest

Located in Section 5 Township 133 Range 29 W, East Sylvan Township Cass County MN



Aerial Photo of Access to Charlie and Carrie Memorial Forest

In 1993 the James Rardin Family donated 40 acres to the Pillager School District and it was added to the school forest. There is a sign at the entrance to this section of the school forest dedicating it as the Charlie and Carrie memorial forest. This parcel has very good access, it is located right on 13th avenue South West just outside the city limits of Baxter MN and East Gull lake MN. A field road runs to the middle of the property providing access to the school forest and an old gravel pit. Terrain is nearly level to gently rolling with sand and loamy sand soils. A pond is located in the middle of this tract. When first obtained, the south side of the pond and the gravel pit area had been filled with garbage, which has since been removed that has been removed.

Date Record of Events .

1993	Rardin family donated the land to the pillager school district, and it was added to the school forest. A forest management plan was written for this parcel and the trash was cleaned up within the school
March 2007	Forester Allen Sharp inventoried and updated stewardship Plan.
December 2017	Forester Alex Brothen inventoried and updated stewardship plan.

MANAGEMENT COVER TYPES

1. [Original School Forest](#)

The Pillager school forest has been used for 65 years as a location to study forest management and teach students about the conservation of our natural resources. There are many opportunities that could be applied forest wide to help teach students as well as opportunities in each stand for students to learn.

Recommendations

Action: Having the students help maintain the forest trails and openings within the forest.

Action: Create a series of interpretive signs within the school forest. These signs could be used to describe the forest, the trees, unique features and management that has been done within each stand of trees. This could be an opportunity for the students to help design and build the signs as well as write the information to be placed on the signs.

Action: Continue to use the forest to teach valuable out door skills such as orienteering and tree identification. You could also consider setting up geocache locations within the forest to help teach how to navigate with GPS units.

Action: Set up scent post survey sites within the forest to see what types of wildlife are in the forest. To do this, put a scent tab on a post within the forest. Under the scent post, prepare the soil so it is soft and any animal tracks will become imprinted in the soil. Periodically check the scent post to see what type of animal tracks you see. Have your students identify the tracks. Other options that you could do with this would be to set up a game camera to try photograph the animals or create casts of the animal tracks that you find at the survey site.

Cover Type: Norway and White Pine

There are 4 pine stands located within the original school forest, while they are of different ages they are all currently mature forests, and are on the current timber sale that will be harvested in the winter of 2017 to 2018. A copy of the sale is located in appendix A.

Cover Type Objective: To use this land as an educational tool through self-guided trail and demonstrational harvests and habitats.

The timber sale that you have planned is a great teaching opportunity to get your students into the school forest. There are many things that you can use the timber sale to teach students. These opportunities could be done in any of the areas that are to be thinned.

Main Recommendation

Action: Visit harvest that is occurring

You should bring the students out to the timber sale this winter so they can see an active logging operation within their school forest. This is a great opportunity to meet the logger, see their equipment and learn how a forest is thinned. All aspects of the operation would be good for them to see. I highly recommend that you have the students visit the sale at least once during its operation.

Alternative Recommendation

Action: Variable density thinning

If you are interested in a longer term project for your school forest you have a unique opportunity with this timber sale. Create a couple of locations within the thinning area where the stand is thinned to different densities. Have one that is not thinned, one that is thinned normally, and one that is thinned heavily. You can then have the students set up permanent plots in each of these areas where the student can measure each year how the thinning has effected the growth of the trees. Tree species, diameter, tree height, and live crown ratio are all things that can be measured over time to show the effect of thinning on a stand of trees. This is a longer term project but could be used to show the effects of thinning on a stand.

Action: Have students mark trees to be thinned

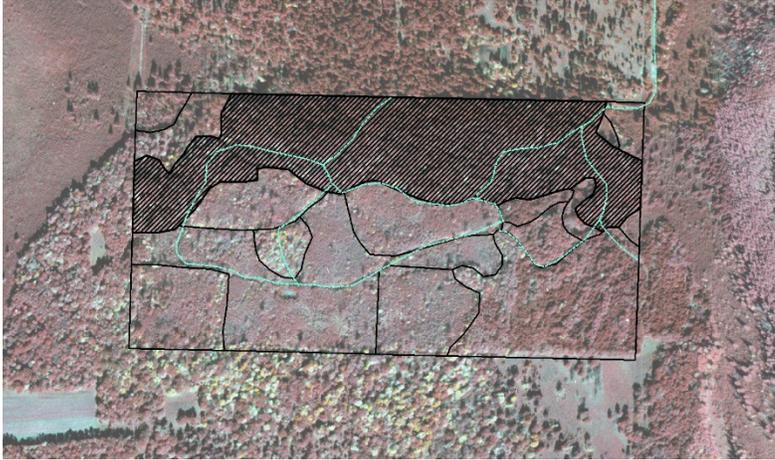
While the timber sale is set up as logger select, you could choose a small portion of the sale area to have the students mark the trees to be thinned. Through this they can learn about tree quality, stand density, species diversity, and the practicality of how a logger well access a location to do the work.

Action: Mill tour or portable sawmill

The wood harvested from your timber sale will be utilized by the timber industry in Minnesota. Some will be chipped either on site or at a mill, while other portions of it may be taken as logs and bolts to a mill to be sawn into dimensional lumber. At the presale meeting with the logger you should ask to see where the harvested wood will be brought to once it is cut. You could contact one of the mills to see if they will be able to do a mill tour for the students. The students will be able to see the trees from their school forest be harvested, how they are scaled, and eventually how it will be turned into a product to be sold und used.

If traveling to a mill is not possible, the mill may be able to travel to your school forest. There are many small portable sawmill operations near your school forest. One of these operators may be willing to come to your forest and mill a couple of the logs harvested off of your school forest into lumber. This lumber could then be used by your school to create nesting boxes, kiosks, or other projects for your school forest.

Cover Type Label: 1 (Norway Pine Saw timber)



Acres: 27.21

Cover Type Description: This stand consists mainly of mature Norway and white pine saw timber. These trees average approximately 18 inches D.B.H. There are some smaller pole timber sized trees within the stand as well. Pole timber includes Norway pine, white pine, aspen, and paper birch. This stand has a very high density, and is growing on a good site for pine.

Some of the white pine is infected with white pine blister rust and heart-rot. The paper birch and aspen are also declining from rotting diseases.

The understory consists of a moderate density of hazel and several tree seedlings and saplings. White pine saplings are most abundant with red maple, paper birch, aspen, and red oak also present.

Several different logging operators thinned this stand in 1980-1981. Approximately 49 MBF were removed with some trees being used for cabin logs.

Tree Summary Data	Estimated Volume/Acre
Age: 100+ years	Species: Oak, Bur
Growth potential: Very good (SI = 62) Tree Density: High (BA = 152) Timber Quality: Very Good	0.8 Cords/Acre
	Species: Birch, Paper 2.0 Cords/Acre
	Species: Aspen, Trembling

	Species: Pine, Norway 11.3 Cords/Acre, 14.5 MBF/Acre
Timber Volume: 17.9 Cords/Acre, 15.5 MFB/Acre (estimate only not to be used for timber sales)	Species: Pine, White

Cover Type Objective: To use this land as an educational tool through self-guided trail and demonstrational harvests and habitats.

Cover Type Objective: To promote land and wildlife stewardship.

Main Recommendation

Action: Thinning

This stand is currently selected to be thinned in the winter of 2017 to 2018. This stand is in need of a thinning and will greatly benefit from having it done. The timber permit describes the thinning as follows.

“Thin pine stand by removing the standing dead or dying trees first, trees that have but scars from previous activity, suppressed and/or deformed trees, then focus on spacing. Favor Healthy, vigorous well-formed trees. Residual trees should be spaced approximately 18-20 feet apart.” (Timber permit in appendix)

When this thinning is completed the density of the stand will be reduced to a good level to promote continued growth of the stand.

Since the timber permit does not differentiate which species of healthy well-formed tree to retain vs remove, you have the opportunity to effect the feel of the future stand through which trees species are retained. You should talk with the forester that set up the sale and the logger to let them know what you would like the stand to look like when the sale is completed.

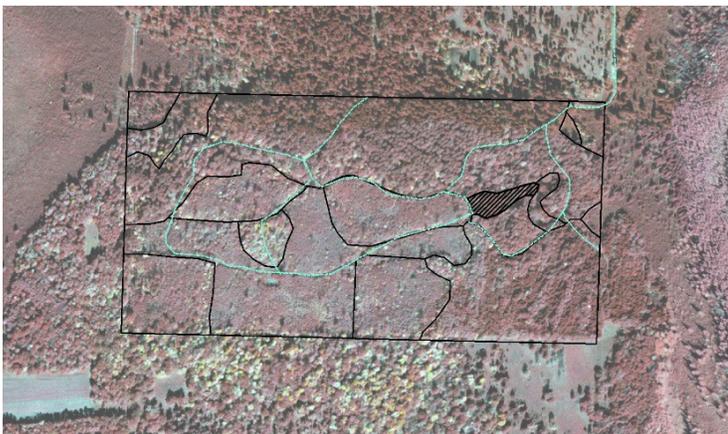
Option 1: Retain mostly Norway pine.

This stand is producing wonderful Norway pine, and will continue to do so into the future. Targeting your management to this species will retain your ability to continue to produce quality Norway pine saw logs into the future.

Option 2: Try to retain as much healthy mature white pine and a few other mature hardwoods within the stand.

Norway and white pine will both grow very well on this site, in addition the two species can be managed well together. Retaining a diversity of tree species will provide the best habitat for wildlife possible. If left alone the white pine would continue to fill the understory of the stand slowly pushing the stand towards white pine. While aspen, maple, and oak may not be growing as well within the stand as the Norway and white pine they do provide a great benefit to wildlife within the stand. I would highly recommend retaining some of the aspen, white pine, oak, and maple within the stand

Cover Type Label: 2 (Norway Pole timber) Acres: 0.82



Cover Type Description: Planting records and old stewardship plans for the school forest show that this stand along with stand number 4 were planted to Norway pine in 1954. These plantation rows can still be seen in the stand today. The stand is primarily Norway pine that are on average 12 inches in diameter. There is also a small amount of white pine, aspen and ash within the stand. The density of the stand is high at basal area of 155 and could benefit from being thinned. This stand of trees has been identified on the winter of 2017 to 218 timber harvest as an area of optional timber.

Tree Summary Data	Estimated Volume/Acre
Age: 60 years	Species: Pine, White
Growth potential: <i>Very Good</i> (SI = 65) Tree Density: <i>High</i> (BA = 155) Timber Quality: Good	1.5 Cords/Acre
	Species: Aspen, Trembling 6 Cords/Acre
	Species: Pine, Norway
	31.5 Cords/Acre
	Species: Spruce White
Timber Volume: 42 Cords/Acre (estimate only not to be used for timber sales)	

Cover Type Objective: To use this land as an educational tool through self-guided trail and demonstrational harvests and habitats.

Cover Type Objective: To promote land and wildlife stewardship.

Main Recommendation

Action: Thinning

This stand is ready to be thinned and you should consider thinning it in the winter of 2017 to 2018. This stand should be thinned similarly to the other stands identified to be harvested.

When thinning his stand make sure not to remove more than 1/3 of the total stand volume and try to retain diversity in species of remaining trees.

If you thin this stand it will look very similar to what it looks like right now. Over the next 10 years the remaining trees will respond by putting on more diameter growth getting large each year until they are ready to be thinned again.

Alternative Recommendation

Action: No Action-Free to Grow

This stand still has some room to grow before it becomes too dense and the high density of the stand starts harming the trees. If you do nothing to this stand, over the next ten years you will notice the aspen and ash die out of the stand and a few of the smaller over topped Norway and white pine will also die. These dying trees will produce snags and down logs for wild life habitat. You will also notice that the remaining live pine will not increase in diameter as quickly as if they are thinned.

Cover Type Label (on map): 3 (Norway Pine/Aspen Pole Timber)

Acres: 11.46



Cover Type Description: This area was once an aspen stand with scattered large Norway pine saw timber. Around 1980 a windstorm caused severe damage of this stand. Logging occurred

to salvage the damaged timber.

In 1981, this 12-acre site was sheared and windrowed to prepare it for tree planting. That spring, 10,000 Norway pine seedlings were planted by Warren Stark to reforest the site. The Norway pine in this stand was then released from competition in 1994.

Currently the stand is comprised of mature Norway pine with a small amount of mature aspen red maple white pine and white spruce within the stand. The topography within this stand is having an effect on where the Norway pine vs the aspen is growing. The Norway is growing on slightly higher elevation than the aspen. The density of the stand is high enough for it to be thinned. This stand of trees has been identified on the winter of 2017 to 218 timber harvest as an area of optional timber.

The understory consists of a light to moderate density of hazel, dogwood, and cherry shrubs.

Age: 35 years	Species: Pine, White
Growth potential: <i>Very good</i> (SI = 67) Tree Density: <i>Moderate</i> (BA = 136) Timber Quality: Very Good	.66 Cords/Acre
	Species: Aspen, Trembling
	4.3 Cords/Acre
	Species: Pine, Norway
	26.3 Cords/Acre
	Species: Spruce, White
Timber Volume: 33.5 Cords/Acre (<i>estimate only not to be used for timber sales</i>)	

Cover Type Objective: To use this land as an educational tool through self-guided trail and demonstrational harvests and habitats.

Cover Type Objective: To promote land and wildlife stewardship.

Main Recommendation

Action: Thinning

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